Language Processing outside the Realm of Consciousness

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The concept "Out of sight, out of mind" has been repeatedly challenged by findings that show visual information biases behavior even without reaching consciousness. However, the depth and complexity of unconscious processing remains elusive. To tackle this issue, we examined whether high-level linguistic information, including syntax and semantics, can be processed without consciousness.

Using binocular suppression, we showed that after a visible sentential context, a subsequent syntactically incongruent word broke suppression and reached consciousness earlier. Critically, when the sentential context was suppressed while participants made a lexical decision to the subsequent visible word, faster responses to syntactically incongruent words were obtained. Further control experiments show that (1) the effect could not be explained by simple word-word associations since the effect disappeared when the subliminal words were flipped and (2) the effect occurred independent of accurate localization of the subliminal text.

In another study we utilized a "double Stroop" paradigm where a suppressed colored word served as a prime while participants responded to a subsequent visible Stroop word. In the word-naming task, we showed that word but not color inconsistency slowed down the response time to the target, suggesting that semantic retrieval was prioritized. However, when asked to name the color, the same effect was obtained only after a significant practice effect on the color naming (i.e. reduction of response time) occurred, suggesting a competition of attentional resources between the current conscious task and unconscious stimulus. These findings were later replicated in separate experiments.

Across multiple studies we showed that high-level linguistic information can be processed unconsciously and exert an effect. These findings push the limit of unconscious processing and further show that an interplay between conscious and unconscious processing is crucial for such unconscious effect to occur.

The Feeling of Volition as a Retrospective Observational Inference

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We generally assume that intentions and decisions cause our voluntary acts: We form a conscious intention to do something, and then this mental act leads to a bodily act. Neuroscientific research into the timeline of volition faces the challenge of measuring and reconciling events along many unstably related timelines - external, neural and mental. We use motor TMS stimulation to create a reference event, allowing for single-trial temporal order judgements to be meaningful across all the timelines.

We use electromyography (EMG) to monitor the participant's (e.g.) thumb. 2) TMS is targeted to motor cortex so as to elicit an involuntary thumb movement. 3) The participant is asked to relax, and at a time of their own choosing, to flex their thumb (a voluntary movement). When the EMG detect the initiation of this movement, it triggers the TMS to activate.

In many cases, the participants report that the TMS click and its resulting thumb movement happened prior to their own volition. Some describe it as if the machine was reading their mind, and just as they were about to decide to act, the TMS beat them to it. The way we have set up the

system, however, the TMS cannot be triggered until the voluntary muscle movement has physically begun.

The initiation of a voluntary act is not a discrete, early event to which we have direct mental access. Instead, it is a process that continues to consolidate after the initiation of movement. Our perception of our intentions depends not only on neural signals generated at initiation onset, but also on the integration of information gathered later. This may be analogous to the role of reentrant feedback to visual cortex in visual consciousness. Contrary to the Cartesian assumption that our introspective awareness is direct, our sense of agency is inferred based on predictive and postdictive inferences about its most likely cause.

Symposium 2-2 (July 30, 2019)

The Early Development of Face and Body Perception

Organizers: Jiale Yang[1] and Yumiko Otsuka[2]
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Human possess remarkable capacities to process face- and body-related signals. Prior studies consistently reported visual sensitivities to face and body at birth (e.g., Filippetti et al., 2013; Johnson et al., 1991). Moreover, culture specific experience shapes the development of the visual system to develop expertise for specific types of faces and bodies (e.g., own-race faces and communicative body gestures). Furthermore, it is well known that the development of face and body perception is at the foundation of more complex perceptual and cognitive abilities, such as learning and social skills. In this symposium, we will present 5 talks focusing on the early development of face and body perception from infancy to childhood by using a broad range of research methods: skin conductance, electroencephalogram (EEG), eye-tracking, and psychophysics measurements.

Xiao will show how experience of face-race determines early development of infants' social perception, social learning, and stereotype formation. Chien will show that the pervasive own-race face experience shapes the development of fine-grained and efficient face perception across childhood, which further links to biased social development in childhood. Nava examines the development of multisensory integration from early infancy to childhood and its contribution to the development of body representation. Yang will show tactile information facilitates visual processing in infants, and how body representation modulates this multisensory enhancement. Hirai will talk about infants' perception of body movements and bodily gestures, and its role in social learning.

In sum, this symposium brings together the latest findings regarding face and body perception across various stages of life and in different culture settings. These studies shed insights into the current advances and future directions of the field of early development of face and body perception.

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The 15th Asia-Pacific Conference on Vision (APCV), 2019

The 15th Asia-Pacific Conference on Vision was held in Osaka, JAPAN, from 29th of July to 1st of August, 2019. The conference aimed to facilitate discussion on vision research in Asian-Pacific region, attended by 458 participants from all over the world. The program consisted of four keynote lectures, 13 symposia including 57 speakers, and 50 oral and 220 poster presentations. The organizing committee are grateful to all the contributions.

The Abstracts are provided below. Keynote talks are presented first, symposia second, and then the contributed talks and posters are listed by session.

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